

## Conducting Your Annual Internal Audit

The North Dakota Radiological Health Rules (NDRHR) state that each licensee must develop, document and implement a sufficient radiation safety program and review that program at intervals not exceeding 12 months (see NDRHR subsection 33-10-04.1-05.3, page 4-5).

What does this mean? How do you establish an internal audit of your own program to ensure it is “sufficient” and in compliance with North Dakota Department of Health requirements?

Answers to these questions vary depending upon the scope of your licensed program. For example, the annual internal audit performed by the radiation safety officer at a major research university will be much more involved than the audit performed by the owner/operator of a company using a single sealed source of radioactive material. However, both of these radiation safety officers will review the same general items during the internal audit process.

These general radiation safety items are:

- ◆ Audit History – correction of all past items
- ◆ Organization – any changes to staff, locations of use or frequency of use
- ◆ Training, Retraining and Instructions to Workers – new employee training; refresher training for all employees
- ◆ Facilities – improvements to storage location; use of additional shielding
- ◆ Radioactive Materials – isotopes, quantities and use as authorized on the license

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## Radiation Exposure and Public Dose Limits

The goal of radiation protection is to prevent the occurrence of radiation-induced injuries of exposed people. The two specific objectives necessary to meet this goal are:

1. To prevent the occurrence of clinically significant radiation-induced deterministic effects by adhering to dose limits.
2. To limit the risk of stochastic effects, cancer and genetic effects to a reasonable level in relation to societal needs, values, benefits gained and economic factors.

These objectives can be achieved by ensuring that all exposures are as low as reasonably achievable (ALARA) and by applying dose limits for both occupational and public exposures.

Based on the hypothesis that genetic effects and some cancers may result from damage to a single cell, the risk of stochastic effects is proportional to dose, without threshold, throughout the range of dose and dose rates of importance in routine radiation protection.

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## Did You Know?

In 1945, there were only three atomic weapons in the world.  
In 1986, there were nearly 70,000.

## Useful Internet Sites for Radiation Safety

North Dakota Department of Health  
Radiation Control Program:  
[www.health.state.nd.us/ndhd/environ/ee/rad/rad.htm](http://www.health.state.nd.us/ndhd/environ/ee/rad/rad.htm)

U.S. Nuclear Regulatory Commission:  
[www.nrc.gov](http://www.nrc.gov)

U.S. DOT Office of Hazardous Material Safety:  
[hazmat.dot.gov](http://hazmat.dot.gov)

U.S. DOE Radioactive Material Packaging Site:  
[www.rampac.com](http://www.rampac.com)

Index of Radioactive Sealed Sources and Devices:  
[www.hsrp.ornl.gov/nrc/ssdr/ssdrindx.htm](http://www.hsrp.ornl.gov/nrc/ssdr/ssdrindx.htm)

Canadian Nuclear Safety Commission  
[www.nuclearsafety.gc.ca/eng/index.htm](http://www.nuclearsafety.gc.ca/eng/index.htm)

## Radiation Exposure and Public Dose Limits (cont.)

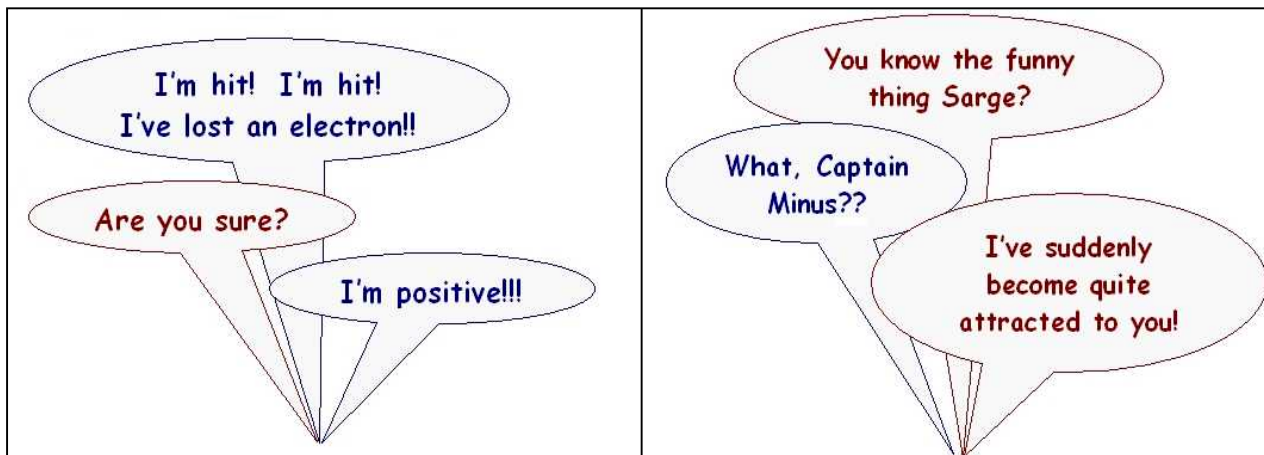
The National Council on Radiation Protection and Measurements (NCRP) has developed recommendations regarding the radiation exposure limits to members of the public as well as to occupationally exposed individuals. NCRP Report No. 116 states that for continuous exposure, it is recommended that the annual effective dose for nonoccupational workers and/or members of the public not exceed one millisievert (100 mrem) from all man-made sources (not including exposures associated with medical care).

Based upon this recommendation, the North Dakota Department of Health has developed regulations for dose limits for individual members of the public. These dose limits are described in Section 33-10-04.1-07 of the North Dakota Radiological Health Rules (pages 4-15 to 4-17).

In summary, these regulations require that all licensees ensure that the total effective dose equivalent received by individual members of the public from licensed or registered operations does not exceed one millisievert (100 mrem) in a year. All licensees are required to document compliance with these regulations by measurement and/or calculation.

Department of Health inspectors will verify licensee compliance with public dose limits during routine radiation safety inspections.

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The Continuing Tragedy of Atomic Warfare

## Enforcement Actions: Learn From Others' Mistakes

Radioactive material licensees face important responsibilities everyday. Numerous regulations exist to protect radiation workers, the public and the environment. Noncompliance with established regulations discovered during inspections performed by regulatory agencies often result in significant enforcement actions. It is hoped that by reviewing the following violations, extra care will be taken in maintaining your radiation safety program while performing licensed activities. Recent examples of significant enforcement actions by the U.S. Nuclear Regulatory Commission appear below:

- ⇒ **Stork/Twin City Testing**, St. Paul, Minn., was issued a Notice of Violation and a civil penalty of \$11,000 for deliberately failing to have two individuals present during radiography at a temporary job site.
- ⇒ **Allegheny Wireline Services**, Weston, W.Va., was issued a Severity Level III violation and civil penalty in the amount of \$5,500 for two violations concerning the deliberate falsification of well site radiation surveys and the deliberate failure of the radiation safety officer to provide adequate oversight.
- ⇒ **West Virginia University**, Morgantown, W.Va., was issued a Severity Level III violation and a civil penalty of \$2,750 for failure to secure licensed material from unauthorized removal. The violations involved unsecured portable gauges and laboratories that were unlocked and unattended.
- ⇒ **Syncor International Corporation**, Woodland Hills, Calif., was issued a Notice of Violation and a civil penalty of \$2,750 for failure to properly block and brace a package of radioactive material during transport.
- ⇒ **Glendive Medical Center**, Glendive, Mont., was issued a Notice of Violation and a civil penalty of \$2,750 for failure to secure molybdenum-99/technetium-99m generators from unauthorized removal or access by unauthorized personnel.
- ⇒ **Virginia Commonwealth University**, Richmond, Va., was issued a Notice of Violation for failure to control and maintain constant surveillance over a strand of iridium-192 used for brachytherapy. The licensee also failed to immediately report, by telephone, to the U.S. Nuclear Regulatory Commission the loss of the radioactive material. The licensee found the strand at an off-site commercial laundry four hours after discovering the loss.
- ⇒ **Bass Energy, Inc.**, Bruceton Mills, W.Va., was issued a Notice of Violation and a civil penalty of \$8,800 for failure to obtain written consent from the U.S. Nuclear Regulatory Commission before transferring control of licensed material to unlicensed companies on two occasions, failure to secure or maintain constant surveillance over licensed material, and failure to provide complete and accurate information to the U.S. Nuclear Regulatory Commission.
- ⇒ **Caribbean Quality Control Services, Inc.**, St. Croix, U.S. Virgin Islands, was issued a Notice of Violation for transferring a portable moisture/density gauge containing radioactive material to an individual who was not authorized to possess or use such a device. During the time in which the non-licensed entity had possession of the gauge, an untrained technician was allowed to operate it.
- ⇒ **David Blackmore & Associates, Inc.**, Pottstown, Pa., was issued a Notice of Apparent Violation for the failure to control and maintain constant surveillance over licensed material. Specifically, a portable moisture density gauge containing 10 mCi of Cs-137 and 150 mCi of Am-241 was left unattended for a short period of time, run over by a construction vehicle, and crushed.

## Conducting Your Annual Internal Audit (cont.)

- ◆ Leak Tests – performed at the required intervals; records maintained
- ◆ Inventories – performed at the required intervals; records maintained
- ◆ Radiation Surveys – radiation levels within limits; instruments calibrated appropriately
- ◆ Receipt and Transfer of Radioactive Materials – adequate procedures; records maintained
- ◆ Transportation – authorized shipments; authorized packages; proper marking, labeling and placarding; use of shipping papers
- ◆ Personnel Protection – dose monitoring; use of the ALARA concept
- ◆ Notices and Postings – “Notice to Workers,” emergency information, caution signs
- ◆ Record Keeping – files maintained in an organized manner for easy review
- ◆ License Conditions – operating in accordance with the license, amendments needed
- ◆ Summary Section – summarize and discuss the audit findings and proposed corrective actions

When performing your annual internal audit, it is important to see how things are actually being done. Do not sit in an office area and simply rely on your memories or ideas of what *should* be happening. Go out and observe your facility and your employees in action, take notes and imagine ways to improve the radiation safety of your facility and operations.

Remember the following important concepts while performing your annual internal audit:

- ▲ Evaluate exposures to workers and the general public to ensure dose rates are maintained as low as reasonably achievable (ALARA).

- ▲ Incorporate the basic ideas of minimizing time around radioactive materials and maximizing distance from radioactive materials, and use shielding material to reduce employee and public exposure to radiation.
- ▲ Think about your existing operating procedures and evaluate whether improvements may be made to increase security or decrease dose rates.
- ▲ Determine the proper level of radiation safety education for all employees and provide additional education or refresher courses.
- ▲ A strong internal audit program should identify weaknesses and allow licensees to take early corrective actions (before Department of Health inspection).

The use of a checklist to document your annual audit review process is a good idea and may be beneficial to your program. Sample annual audit checklists are available from the North Dakota Department of Health Radiation Control Program or the U.S. Nuclear Regulatory Commission.

In addition to the requirement to perform an annual internal audit, records documenting the audit and the corrective actions taken (if any) must be maintained for inspection by the department for at least three years (NDRHR subsection 33-10-04.1-15.2, page 4-40). Completed audit checklists may be used to document your annual review.

If you have any questions or need assistance in developing, modifying or improving your annual internal radiation safety audit or program review, please contact the Radiation Control Program at 701.328.5188.

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*In 1958, a U.S. B-52 bomber accidentally dropped an A-bomb in the back garden of a South Carolina home. Fortunately the bomb did not explode.*